Fossil tracks from Tumbler Ridge: a brief history of collaboration between amateurs and academics

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Northeastern British Columbia has a long history of vertebrate footprint discoveries and research dating back as early as the 1920s. Initially, the majority of the research attention went to the large-scale *in situ* track exposures in the Gething Formation (Lower Cretaceous: Aptian/Albian) exposed along the Peace River Canyon near the town of Hudson's Hope (Sternberg, 1932; Currie, 1989). These tracksites were all flooded in 1979 between the W.A.C. Bennett and Peace Canyon Dams (Currie, 1989). Additional large-scale tracksite finds were made along the Narraway River, but these impressive *in situ* track exposures proved to be short lived as well (Sampson and Currie, 1996). Reports of vertebrate footprints from the Dunvegan Formation (Upper Cretaceous: Cenomanian) date back to the 1950s when Charlie Stelck (University of Alberta) collected specimens from the Pine River area (Currie, 1989). Over the years other finds were made in the same area (Storer, 1975; Currie, 1989; McCrea *et al.*, 1998; McCrea *et al.*, 2001; Scott *et al.*, 2001), but most of these footprint finds consisted of fallen or eroded blocks with one or two prints or very short segments of a trackway. Systematic surveys revealed only a few *in situ* tracks, mainly unidentifiable, or small portions of trackways on sparsely exposed bedding planes along the banks of rivers or creeks.

Figure 1. Daniel Helm (left) and Mark Turner (right) at the Flatbed Creek tracksite (August, 2001).

No significant *in situ* tracksites in northeastern British Columbia were reported until the summer of 2000 when two boys, Mark Turner and Daniel Helm, (then aged 11 and 9 respectively) discovered a trackway when they fell off the inflated tire tubes they were using to navigate a segment of Flatbed Creek near the town of Tumbler Ridge, B.C. (Helm, 2001; 2002) The boys immediately (and correctly) identified the trackway as dinosaurian. By all accounts it took the boys some time to convince the adults in their community that these were dinosaur tracks. The boys showed the trackway to a visiting palaeontologist, Dr. Mark Wilson (University of Alberta), who happened to be in the area. Dr. Wilson confirmed the boys' find (Helm, 2001) and suggested that they contact Dr. Philip Currie at the Royal Tyrrell Museum of Palaeontology. The boys were then referred to me as I happened to be studying fossil footprints as a part of a Ph.D. program at the University of Alberta. By the time

the boys contacted me it was early in the fall of 2000 and I was unable to make a trip to Tumbler Ridge to look at the footprint finds before winter set in. The boys, with the help of their parents and other interested adults, took many pictures and collected preliminary footprint and trackway measurements. One of the boys (Daniel Helm) used the pictures and data to enter a regional science fair for which he received a silver medal.

I was able to visit Tumbler Ridge from August 15–18, 2001 during a brief interlude from my researches at the major tracksites near the town of Grande Cache, Alberta. I was very surprised by the amount of enthusiasm that was displayed by everyone I met, not only the children, but also the adults. There was a wonderful, scenic hiking trail that led to Flatbed Creek to a point where it was necessary to cross to the other side to see the boys' prints. The trackway was composed of two dozen tracks which were the product of a large quadrupedal dinosaur. I was able to identify the trackway as *Tetrapodosaurus borealis*, an ichnotaxon that has been linked to ankylosaurs (Figure 1). The track-bearing bed and surrounding strata are characteristic of the Dunvegan Formation (Late Cretaceous: Cenomanian) which has extensive outcrops to the north of Tumbler Ridge where dinosaur tracks have long been known. The Flatbed Creek tracksite was mapped and measured with the help of the boys Mark and Daniel, as well some interested adults from the community.

During the course of our trackway data collection, a single 25 cm long dinosaur bone was discovered in an ironstone concretion on the same bedding plane the footprints had been made on (Figure 2a). This discovery doubled the number of dinosaur bones known from British Columbia. The bone was removed with the help of the boys Daniel and Mark, and also Daniel's father Charles, a local physician who was a great help in making the plaster jacket for the bone (Figure 2b). This bone now resides in the Fraser-Ft. George Museum in Prince George, British Columbia. Further prospecting along the banks of Flatbed Creek revealed no other tracks and bones on that visit, but a short hike along the banks of the Wolverine River led to the discovery of another *in situ* tracksite, this time with a pair of theropod footprints (Figure 3).

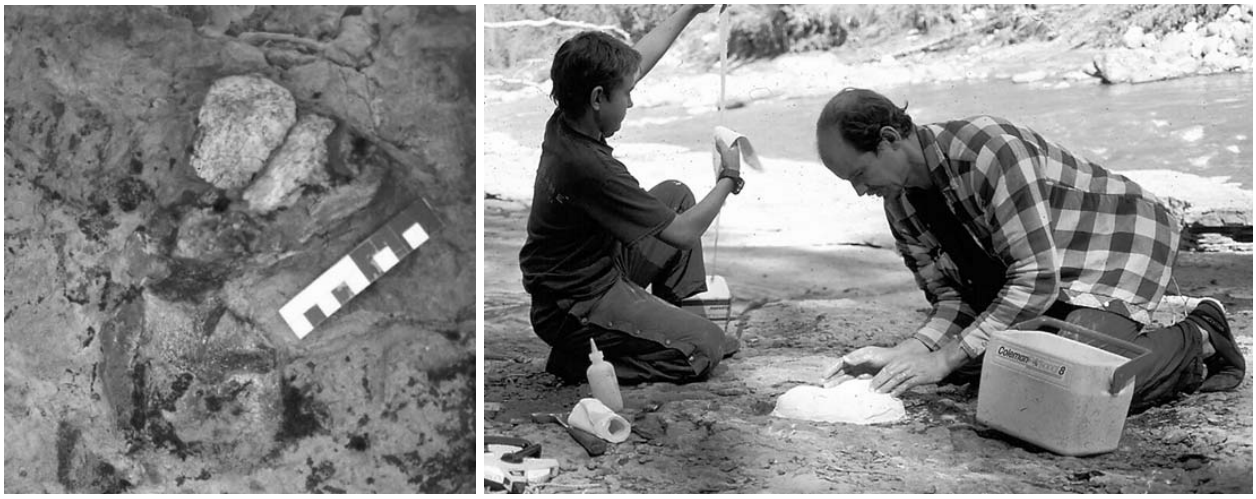

Figure 2. (a) Dinosaur bone in a concretion from the Flatbed Creek tracksite (scale is 10 cm). (b) Mark Turner (left) and Charles Helm (right) jacketing the bone.

Figure 3. Wolverine River tracksite (scale is 10 cm).

Shortly after my visit in August, 2001, a Tumbler Ridge resident, Al Durand, recognized the existence of another significant *in situ* tracksite (Cabin Pool Site) along the banks of Flatbed Creek. This new site was only a hundred or so metres upstream from the boys' initial ankylosaur trackway find. The Cabin Pool Site was documented in the summer of 2002 with the enthusiastic help of several locals (most notably Linda, Ritch & Janelle Roberston, Jill Mason, Charles and Daniel Helm and Mark Turner).

The Cabin Pool Site is approximately 65 square metres in area, but with close to 200 footprints of several ichnotaxa including the tracks of ankylosaurs and a few types of theropods (small and medium-sized). The footprint surface of the Cabin Pool Site has been badly eroded by the spring floods of Flatbed Creek, and the action of tree roots may also have been responsible for some of the damage before the surface had been exposed. Even with the top few centimetres of track surface eroded many of the tracks were impressed deeply enough so that their outlines are still visible, indicating that the substrate was quite soft at the time the track-makers walked upon it. In some places the footprint surface has escaped destructive erosion and there are a few theropod tracks which show impressions of the three main weight-bearing digits (II-IV) as well as the dew claw (digit I) and the back of the leg (Figure 4a and b). Such deep theropod prints are

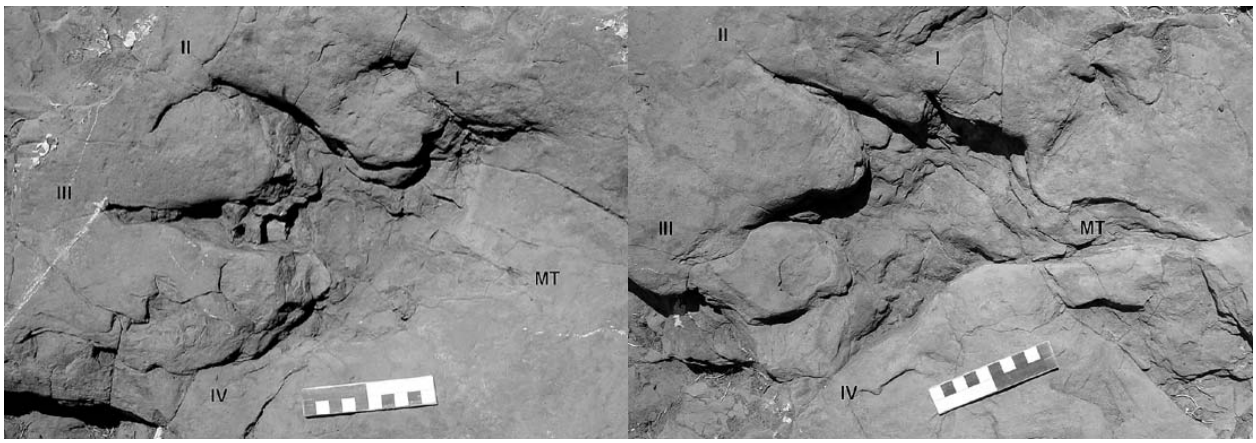

Figure 4. (a—left) A left theropod print from the Cabin Pool tracksite (scale is 10 cm). (b—right) Another left theropod print from the Cabin Pool tracksite (scale is 10 cm).

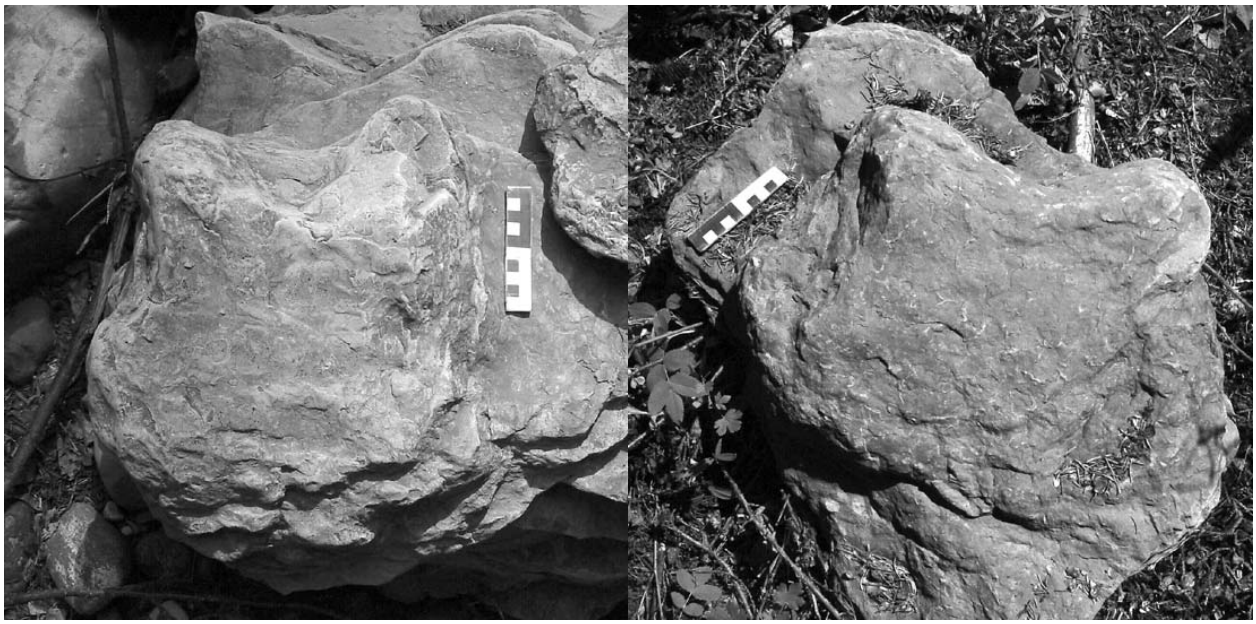

Figure 5 a and b. Natural casts of ornithopod footprints (scale is 10 cm)

uncommon, as theropods seem to avoid stepping on such soft substrates (McCrea, 2000). When theropods did venture onto soft or muddy substrates their trackways reveal that the animal was struggling.

Following a lead by Brian Pate of Chetwynd, the Tumbler Ridge Museum Foundation (T.R.M.F.) explored another local canyon finding several isolated footprints and a few *in situ* tracks. In June, 2002, I was invited to participate in another prospecting expedition to this new canyon during the course of which fifty footprint specimens were documented (Figure 5 a–c). The few *in situ* tracksites in this canyon are relatively small exposures eroded by the creek. One of these tracksites displays an ornithopod trackway occurring as a series of natural casts on the underside of an overhang along a cutbank. Only a couple hundred metres further downstream was another *in situ* tracksite of footprint casts on the underside of an overhang, but this time the exposure was located below creek level, under a small waterfall (Figure 6 a and b). Fossil footprints were not the only finds of significance on this expedition though. During the course of the day Wayne Sawchuk, a resident of Moberly Lake, B.C., was the first to notice fossil bone in a very large sandstone block. Just prior to his find Wayne and I had been discussing some of the small fossil bone fragments that had been found in the

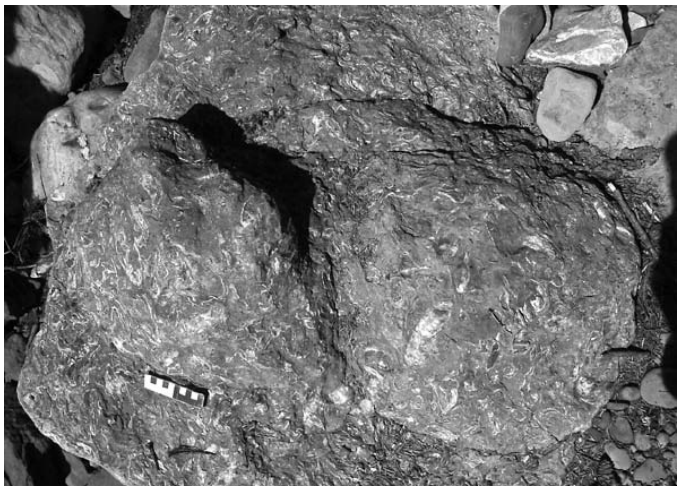

Figure 5c Natural footprint casts with infill of bivalve shell debris

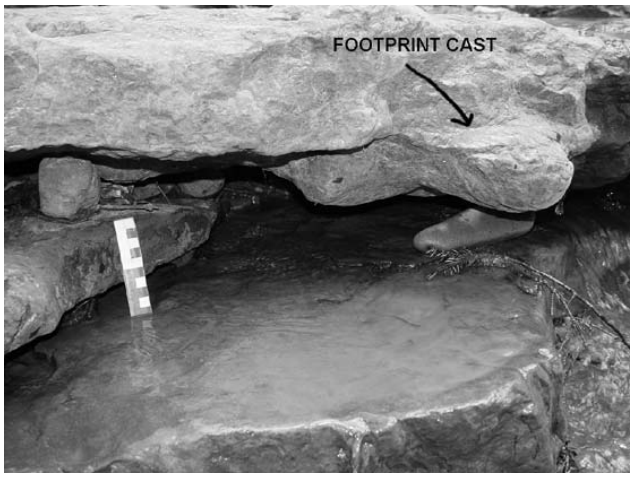

Figure 6a. Natural cast of an ornithopod footprint under a small waterfall

Chetwynd area. Wayne had done a lot of prospecting in that area, and had found many tracks, but no bone. Just two minutes later he made up for his lack of previous finds in a big way. We quickly located several other bones on the outside of the block including some large ribs, a vertebra and a fibula (Figure 7). This find represented the first significant accumulation of dinosaur skeletal material reported from British Columbia (Helm, 2002). Accompanying the dinosaur bones were the bones of a relatively common, though unusual fossil turtle (Don Brinkman, personal communication, 2002).

Many of the creeks and rivers around Tumbler Ridge have now been systematically surveyed by

Figure 6b. Daniel Helm (left), Ritch Robertson (middle) and Linda Robertson (right) at falls.

Figure 7. Dinosaur bones near Tumbler Ridge.

the Tumbler Ridge Museum Foundation and the Wolverine Nordic and Mountain Society led primarily by Charles Helm who is also the author of two books on the history, natural history and palaeontology of Tumbler Ridge and area (Helm 2000; 2001). These preliminary surveys allow the research effort to be concentrated on known areas of promise rather than spending valuable time prospecting in areas that are less prolific in fossil footprints. As a result of these most recent prospecting trips several new track specimens have been found including a slab with a trackway made by a very small ankylosaur (Figure 8). Ornithopod footprints with skin impressions have been found at an *in situ* site at Wolverine Creek, a site that was studied by lantern light during Phil Currie's visit to see the bones and tracks in September of 2002 (Figure 9).

These significant palaeontological finds have sparked the interest of the Tumbler Ridge Community, especially since most of the finds were made by locals. The interest in Tumbler Ridge's palaeontology finds has extended from beyond the local scene to the national, with several CBC radio interviews and a short segment in *Canadian Geographic* (Shilts, 2001). These unique and significant discoveries are a source of pride for a town which has seen its share of hardships with recent closures of two nearby coal mining operations.

The Tumbler Ridge Museum Foundation has taken a lead role in preserving and protecting this region's palaeontological heritage. They have applied for and received protective notation status for many of the fossil sites from Land and Water B.C., and they have applied for a mineral reserve on some of the fossil sites. In cooperation with the District of Tumbler Ridge the T.R.M.F. is recommending the sites be given heritage status by the B.C. government. The T.R.M.F. also included these sites in the B.C. Palaeontological Alliance's ongoing initiative to protect that province's most significant and

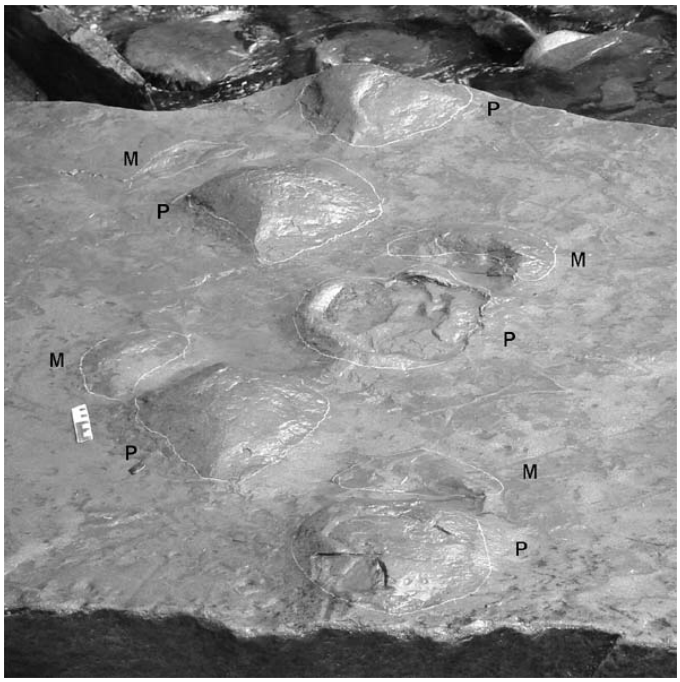

Figure 8. Natural cast of a small ankylosaur trackway near Tumbler Ridge.

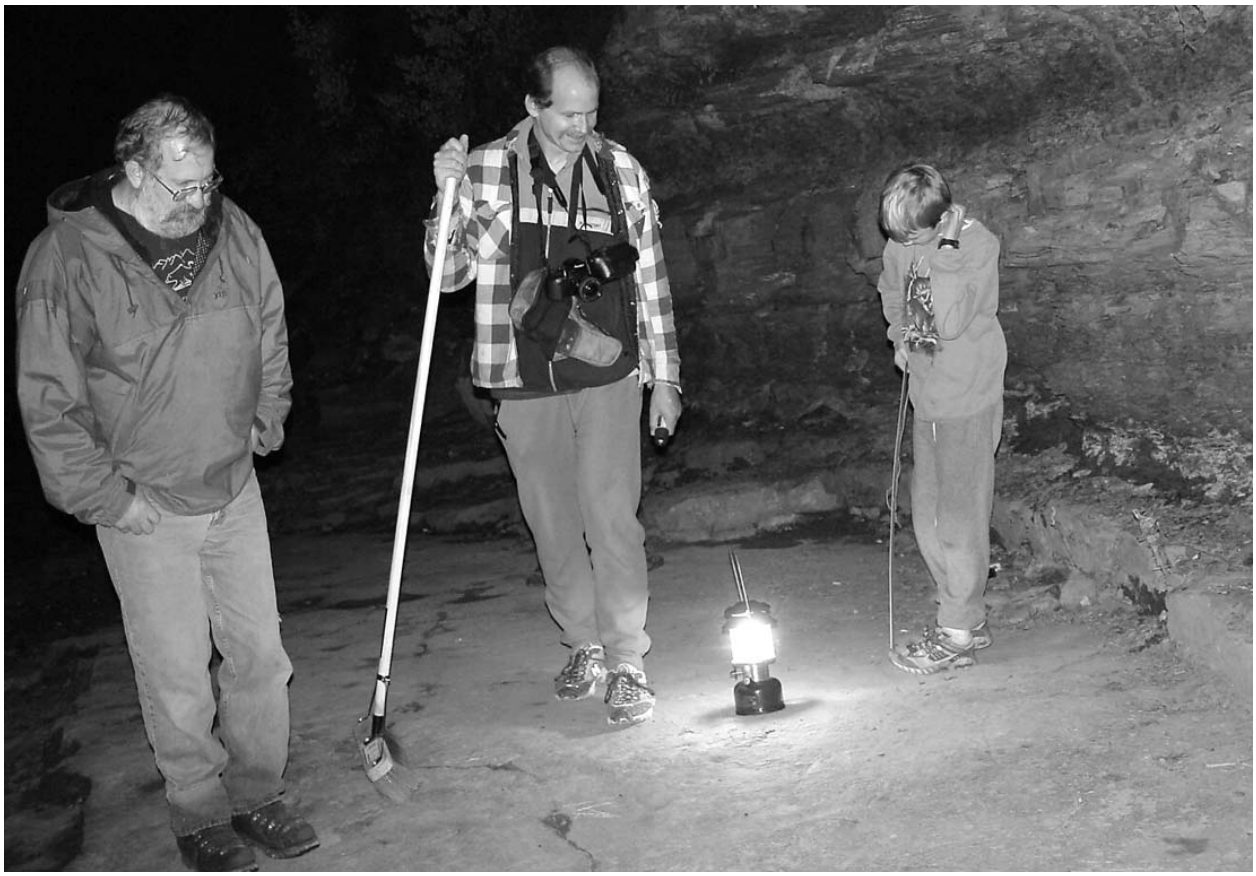

Figure 9. Tracking by lantern light at the Wolverine River tracksite. Don Nesbitt (left), Charles Helm (middle) and Daniel Helm (right).

sensitive palaeontological sites. The T.R.M.F. is also at the forefront of an effort to collect the dinosaur bones from the canyon, a project that is planned for the summer of 2003.

ACKNOWLEDGMENTS

I would like to congratulate my young friends Daniel Helm and Mark Turner for having the imagination to see those first tracks for what they are. I want to thank my friend and comrade-at-arms, Charles Helm for his hospitality and his infectious enthusiasm. Donald Nesbitt has been a solid prospecting companion and trail blazer. My appreciation to Larry and Crys Whyte for their interest and help. Thanks to Kevin Sharman for the tour of Quintette Mine. Linda, Ritch and Janelle Robertson were wonderful company on prospecting trips and were indispensable during the documentation of the Cabin Pool Site. I am grateful to Al Durand for his discovery of the Cabin Pool Site and for his unquenchable thirst for knowledge. Thanks to Wolverine Nordic and Mountain Society for making the incredibly convenient and scenic trails to many of the tracksites.

I thank Dave Eberth and Don Brinkman of the Tyrrell Museum for their help and advice. Bob Campbell of the Fraser-Ft. George Museum (Prince George, B.C.) has been a hard-working partner in helping to get the Tumbler Ridge fossil sites protected. Thanks to Phil Currie for finding the time

to come out to see these important sites and for his assessment of the skeletal material. Finally I would like to express my gratitude to my supervisors George Pemberton (University of Alberta) and Phil Currie (Royal Tyrrell Museum) for the opportunity to conduct this research.

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